

**Appendix D:
“Marked Up” Version of Abstract**

Abstract of the Invention

The present invention is a two-domain, bi-functional fusion protein that functions as a model for a mutually-exclusive domain folding molecular switch comprising a two-domain, bifunctional fusion protein wherein the free energy released by the folding of a first domain of the fusion protein drives an unfolding of a second domain of the fusion protein, and vice versa. The molecular structure of the fusion protein is engineered so that, at any time, the folding of the first domain necessarily unfolds the other domain, and vice versa, thereby making the folded and unfolded states of the first and second domains mutually exclusive. This is accomplished by the insertion of an exemplary ubiquitin insert protein into a surface loop of an exemplary barnase target protein subject to ~~a novel~~ the structural design criterion wherein that the N-C terminal length of the exemplary ubiquitin insert protein is at least two-times greater than the C α -C α alpha-carbon-alpha-carbon length of the surface loop of the exemplary barnase target protein.